

SEQUENCE LISTING

<110> Jørgensen, Steen Troels
Rasmussen, Michael Dolberg
Andersen, Jens Tønne
Olsen, Carsten

<120> Multiple insertion of genes

<130> 10022.204-US

<160> 50

<170> PatentIn version 3.1

<210> 1

<211> 30

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 1

gacttaagctt ctgcatacgatg agagaagacg

30

(B)

<210> 2

<211> 67

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 2

gactgtattc agatctgcgg ccgcacgcgt gtcgacagta ctgaaataga ggaaaaata

60

agttttc

67

<210> 3

<211> 33

<212> DNA

<213> Artificial Sequence

<220>

<223> Primer

<400> 3

gactgtattc cgtatccatt cctgcgatat gag

33

<210> 4

<211> 41

<212> DNA

<213> Artificial Sequence

POLYMER

<220>
<223> Primer

<400> 4
gactggatcc agatcttatt acaaccctga tgaatttgtc g 41

<210> 5
<211> 60
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 5
gactggatcc agatctgcta gcatcgatcc gcggctattt ccattgaaag cgattaattg 60

<210> 6
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 6
tatttcccga gattctgtta tcgactcgct c 31

<210> 7
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 7
gttttcggcc gctgtccgtt cgtcttt 27

<210> 8
<211> 27
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 8
gtgtgacgga taaggccgcc gtcattg 27

<210> 9
<211> 28
<212> DNA

<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 9 ctttgtctc ggagcctgca ttttgggg	28
<210> 10	
<211> 26	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 10 agcattattc ttcgaagtgc cattgg	26
<210> 11	
<211> 45	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 11 ttaagatctt ttttatacaa ataggctaa caataaagta aatcc	45
<210> 12	
<211> 3342	
<212> DNA	
<213> <i>Bacillus licheniformis</i>	
<220>	
<221> CDS	
<222> (1303)..(2469)	
<223> DNA sequence of the <i>dal</i> -gene encoding D-alanine racemase	
<220>	
<221> misc_feature	
<222> (2685)..(2685)	
<223> n denotes an undetermined nucleotide	
<400> 12 gcgtaccgtt aaagtgcgaac agcggtttct tccttttac atccatggat taaaaagggg	60
ttgaaaaaaag gtgagaaaaaa gctttgtttt gcttttaacg gggctgcattg taatccttat	120
gctttctgcc tgccggccaaa aatcgcaaga agatgttgtg acggggctcg acaagaaggc	180
aaaagaatac acgtcctata aggcaaaagc gaaaatgacc attgaaacgg ggaatgaccc	240

gcaggagtagac aacgtggaaa tctggcataa aaaacccctct ctttaccggg tctatttggaa	300
aaacccgaaa aaagaccaga gccaggtgat cttgcgaat gaaaacggcg tgtttgttt	360
gactccgtcg ctgaataaaa gcttccgctt tcacagcgac tggcccaata acagcagcca	420
ggtatactta ttcgaatcgc tcgtaaagga tgtaaaaat gatggggaaag cttcttttc	480
cgcaaaggat tcaaaataca ttttgaaac gaaaacgaat tatcagcata atcagatgct	540
gccgactcag gaaatcgaaa tccataaaaaa gaccatggct cttcatcggtt taaaagtgtat	600
ggataccgac cgcaaaccga tggtaaaggat tgagtttaca agcttgaat tcgataagcc	660
gctcgataaa gactctttt atgaaaagaa aaatatgacg ctgtctcaaa ttgacgttagc	720
gacaagcgct gacgtgtcag actctttcgc tgtcaaaacg ccgctcgatg tgcctcaggg	780
cgtaaaaaag cttgaagaga aagagatggc gactgaagac ggcaaacgga tcgtcatcac	840
atatggcggt gaaaaatcct ttacattgat tcagaaaaaa gcccgcgtcg ccaaaacatc	900
cacttccgta tccatgaacg gagagcccgt tgacctcggc ttcacggcgtcg ggcactgac	960
ggataaaatcg ttgtcatgga catatgacgg agtcgattac tttatctcat cagaagatct	1020
ttctcaagat gaacttctga tggttgcaaa aagcatgcag ggacagtctt cgaaatagac	1080
tgtgccgtat ccggcagcct gtttccgccc cggaagcggaa aagcaggctt ttttatattt	1140
gcgtcgcaag cgtatgattt cgacagcttt tccgtaaaat gtataccgtg ccagcaattt	1200
ttctttgtt cagggctgat gatcccgtgc aaaatttccc tttctccgaa ctttttagta	1260
tgatggaaag gacgagtgaa acaaggaaca ggaagtgtca tg atg agc tta aaa	1314
Met Ser Leu Lys	
1	
cca ttc tat aga aag aca tgg gcc gaa atc gat tta acg gct tta aaa	1362
Pro Phe Tyr Arg Lys Thr Trp Ala Glu Ile Asp Leu Thr Ala Leu Lys	
5 10 15 20	
gaa aac gtc cgc aat atg aag cgg cac atc ggc gag cat gtc cgc ctg	1410
Glu Asn Val Arg Asn Met Lys Arg His Ile Gly Glu His Val Arg Leu	
25 30 35	
atg gcc gtc gtt aaa gcg aat gcc tac gga cac ggg gat gca cag gta	1458
Met Ala Val Val Lys Ala Asn Ala Tyr Gly His Gly Asp Ala Gln Val	
40 45 50	
gcg aag gcg gct ctt gca gaa ggg gcg tcc att ctt gct gtg gct tta	1506
Ala Lys Ala Ala Leu Ala Glu Gly Ala Ser Ile Leu Ala Val Ala Leu	
55 60 65	
ttg gat gaa gcg ctt tcg ctg agg gcg cag ggg att gaa gaa ccg att	1554
Leu Asp Glu Ala Leu Ser Leu Arg Ala Gln Gly Ile Glu Glu Pro Ile	
70 75 80	

TOP SECRET

ctt gtc ctc ggt gca gtg ccg acc gaa tat gca agc att gcc gcg gaa Leu Val Leu Gly Ala Val Pro Thr Glu Tyr Ala Ser Ile Ala Ala Glu 85 90 95 100	1602
aag cgc att atc gtg act ggc tac tcc gtc ggc tgg ctg aaa gac gtg Lys Arg Ile Ile Val Thr Gly Tyr Ser Val Gly Trp Leu Lys Asp Val 105 110 115	1650
ctc ggt ttt ctg aat gag gcc gaa gct cct ctt gaa tat cat ttg aag Leu Gly Phe Leu Asn Glu Ala Glu Ala Pro Leu Glu Tyr His Leu Lys 120 125 130	1698
atc gac acg ggc atg ggc cgc ctt ggc tgc aaa acg gaa gaa gag atc Ile Asp Thr Gly Met Gly Arg Leu Gly Cys Lys Thr Glu Glu Glu Ile 135 140 145	1746
aaa gaa atg atg gag atg acc gaa tcg aac gat aag ctc aat tgt acg Lys Glu Met Met Glu Met Thr Glu Ser Asn Asp Lys Leu Asn Cys Thr 150 155 160	1794
ggc gtg ttc act cat ttc gcc acg gcg gac gaa aag gac acc gat tat Gly Val Phe Thr His Phe Ala Thr Ala Asp Glu Lys Asp Thr Asp Tyr 165 170 175 180	1842
tcc aac atg cat ctt gac cgc ttt aaa gag ctg atc agc ccc ttc ccg Phe Asn Met His Leu Asp Arg Phe Lys Glu Leu Ile Ser Pro Phe Pro 185 190 195	1890
ctt gac cgt ttg atg gtg cat tcg tca aac agc gcc gcg ggt ctg cgc Leu Asp Arg Leu Met Val His Ser Ser Asn Ser Ala Ala Gly Leu Arg 200 205 210	1938
tcc agg gaa cag cta ttt aat gcc gtc cgc ttc ggc atc ggc atg tac Phe Arg Glu Gln Leu Phe Asn Ala Val Arg Phe Gly Ile Gly Met Tyr 215 220 225	1986
ggg ttg gcg ccg tca acc gaa ata aaa gac gag ctg ccg ttt cgt ctg Gly Leu Ala Pro Ser Thr Glu Ile Lys Asp Glu Leu Pro Phe Arg Leu 230 235 240	2034
cgg gaa gtg ttt tcg ctt cat acc gaa ctc acc cat gtg aaa aaa att Arg Glu Val Phe Ser Leu His Thr Glu Leu Thr His Val Lys Lys Ile 245 250 255 260	2082
aaa aaa ggc gag agc gtc agc tac ggg gcg aca tat aca gct cag cgc Lys Lys Gly Glu Ser Val Ser Tyr Gly Ala Thr Tyr Thr Ala Gln Arg 265 270 275	2130
gac gaa tgg atc ggg aca gtc ccc gtc ggg tat gcc gac gga tgg ctg Asp Glu Trp Ile Gly Thr Val Pro Val Gly Tyr Ala Asp Gly Trp Leu 280 285 290	2178
agg cgc ctg gcc gga acg gaa gtg ctg atc gac gga aaa cgc caa aaa Arg Arg Leu Ala Gly Thr Glu Val Leu Ile Asp Gly Lys Arg Gln Lys 295 300 305	2226
ata gca ggg aga atc tgc atg gac cag ttc atg att tcc ctt gcc gaa	2274

□ 992 EER 14, 2000

Ile Ala Gly Arg Ile Cys Met Asp Gln Phe Met	Ile Ser Leu Ala Glu		
310	315	320	
gaa tac cct gtc ggc aca aag gtt acc ttg atc gga aag caa aaa gac		2322	
Glu Tyr Pro Val Gly Thr Lys Val Thr Leu Ile Gly Lys Gln Lys Asp			
325	330	335	340
gaa tgg atc tca gtc gac gaa atc gcc caa aat ttg cag acg atc aat		2370	
Glu Trp Ile Ser Val Asp Glu Ile Ala Gln Asn Leu Gln Thr Ile Asn			
345	350	355	
tat gaa att acc tgt atg ata agt tca agg gtg ccc cgt atg ttt ttg		2418	
Tyr Glu Ile Thr Cys Met Ile Ser Ser Arg Val Pro Arg Met Phe Leu			
360	365	370	
gaa aat ggg agt ata atg gaa ata agg aat ccg atc ttg cct gat caa		2466	
Glu Asn Gly Ser Ile Met Glu Ile Arg Asn Pro Ile Leu Pro Asp Gln			
375	380	385	
tcc tgaaaattga tgaatttagcg gaaaaacaac tttgcttgcg aaaagaataa		2519	
Ser			
tgatatgatt atgaatggaa tggatagagt gttgtatccg taagtttgt ggaggtgtat		2579	
gtttttgtct gaatccagcg caacaactga aatattgatt cgcttgccag aagcttttagt		2639	
atcagaactg gatgggtgtcg tcatgcgaga taaccgggag caggnatga actgatttt		2699	
ccaagccaca aaaatgtagg aacgcgaacg caaaaaatcg acaaattcgg ggaatcgatg		2759	
agaagcggtt atatggagat ggccaagatc caatttgaac atctcttctg aggctcaatt		2819	
tgcagagtat gaggctgaaa acacagtaga gcgcctacta agcggatgtat aatcatttga		2879	
ttgttaaacg cggcgatgtt tattttgctg acctatctcc tgggtttggc tcagaacaag		2939	
gcgggggtgcg cccggtttta gtgattcaaa acaacatcg caatcgcttc agcccaactg		2999	
ctattgttgc agccataaca gccccaaatac agaaagcaaa attacctacc cacgtcgaaa		3059	
ttgatgcgaa acgctacggt tttgaaagag actccgttat attgctcgaa caaattcgga		3119	
cgattgacaa gcaaagatta acggacaaaa tcacccatct cgatgtgaa atgtatggaaa		3179	
aggtcaacga agccttacaa atcagttgg cactcattga ttttaatat tggatgaaagt		3239	
tgctcgaggc gaaagagcaa cttttttgt gttcaaaaat aacaatacga tataatggta		3299	
actgttagtc ctttttttgt tagccagatg tagtcagggg gat		3342	

<210> 13
<211> 389
<212> PRT
<213> *Bacillus licheniformis*

<220>

<221> misc_feature
<222> (2685)..(2685)
<223> n denotes an undetermined nucleotide

<400> 13

Met Ser Leu Lys Pro Phe Tyr Arg Lys Thr Trp Ala Glu Ile Asp Leu
1 5 10 15

Thr Ala Leu Lys Glu Asn Val Arg Asn Met Lys Arg His Ile Gly Glu
20 25 30

His Val Arg Leu Met Ala Val Val Lys Ala Asn Ala Tyr Gly His Gly
35 40 45

Asp Ala Gln Val Ala Lys Ala Ala Leu Ala Glu Gly Ala Ser Ile Leu
50 55 60

Ala Val Ala Leu Leu Asp Glu Ala Leu Ser Leu Arg Ala Gln Gly Ile
65 70 75 80

Glu Glu Pro Ile Leu Val Leu Gly Ala Val Pro Thr Glu Tyr Ala Ser
85 90 95

Ile Ala Ala Glu Lys Arg Ile Ile Val Thr Gly Tyr Ser Val Gly Trp
100 105 110

Leu Lys Asp Val Leu Gly Phe Leu Asn Glu Ala Glu Ala Pro Leu Glu
115 120 125

Tyr His Leu Lys Ile Asp Thr Gly Met Gly Arg Leu Gly Cys Lys Thr
130 135 140

Glu Glu Glu Ile Lys Glu Met Met Glu Met Thr Glu Ser Asn Asp Lys
145 150 155 160

Leu Asn Cys Thr Gly Val Phe Thr His Phe Ala Thr Ala Asp Glu Lys
165 170 175

Asp Thr Asp Tyr Phe Asn Met His Leu Asp Arg Phe Lys Glu Leu Ile
180 185 190

Ser Pro Phe Pro Leu Asp Arg Leu Met Val His Ser Ser Asn Ser Ala
195 200 205

POLYMER

Ala Gly Leu Arg Phe Arg Glu Gln Leu Phe Asn Ala Val Arg Phe Gly
210 215 220

Ile Gly Met Tyr Gly Leu Ala Pro Ser Thr Glu Ile Lys Asp Glu Leu
225 230 235 240

Pro Phe Arg Leu Arg Glu Val Phe Ser Leu His Thr Glu Leu Thr His
245 250 255

Val Lys Lys Ile Lys Lys Gly Glu Ser Val Ser Tyr Gly Ala Thr Tyr
260 265 270

Thr Ala Gln Arg Asp Glu Trp Ile Gly Thr Val Pro Val Gly Tyr Ala
275 280 285

Asp Gly Trp Leu Arg Arg Leu Ala Gly Thr Glu Val Leu Ile Asp Gly
290 295 300

Lys Arg Gln Lys Ile Ala Gly Arg Ile Cys Met Asp Gln Phe Met Ile
305 310 315 320

Ser Leu Ala Glu Glu Tyr Pro Val Gly Thr Lys Val Thr Leu Ile Gly
325 330 335

Lys Gln Lys Asp Glu Trp Ile Ser Val Asp Glu Ile Ala Gln Asn Leu
340 345 350

Gln Thr Ile Asn Tyr Glu Ile Thr Cys Met Ile Ser Ser Arg Val Pro
355 360 365

Arg Met Phe Leu Glu Asn Gly Ser Ile Met Glu Ile Arg Asn Pro Ile
370 375 380

Leu Pro Asp Gln Ser
385

<210> 14
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 14
gatgaacttc tgatggttgc

20

<210> 15	
<211> 26	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 15	26
aaaggatccc cctgactaca tctggc	
<210> 16	
<211> 39	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 16	39
aaagcggccg cgagactgtg acggatgaat tgaaaaagc	
<210> 17	
<211> 32	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 17	32
aaagaattcg tgaaatcagc tggactaaaa gg	
<210> 18	
<211> 32	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 18	32
aaaggatccc gcaagcaaag ttgttttcc gc	
<210> 19	
<211> 30	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	

2438260

<400> 19		
aaaggtaccg aaagacatgg gccgaaatcg		30
<210> 20		
<211> 32		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Primer		
<400> 20		
aaaggtaccg gtaatgactc tctagcttga gg		32
<210> 21		
<211> 33		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Primer		
<400> 21		
caaatcgatc atcaccgaaa cgcggcaggc agc		33
<210> 22		
<211> 31		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Primer		
<400> 22		
attaaagcttg atatgattat gaatggaatg g		31
<210> 23		
<211> 30		
<212> DNA		
<213> Artificial Sequence		
<220>		
<223> Primer		
<400> 23		
aaagctagca tccccctgac tacatctggc		30
<210> 24		
<211> 24		
<212> DNA		
<213> Artificial Sequence		
<220>		

TACATCTGAGCTAAC

<223> Primer	
<400> 24	
gcgtaccgtt aaagtcgaac agcg	24
<210> 25	
<211> 30	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 25	
aaagctagca tccccctgac tacatctggc	30
<210> 26	
<211> 5761	
<212> DNA	
<213> Bacillus licheniformis	
<400> 26	
accggggccg ggcgtttgt cgccaacgtc tgtatattc agcattgaaa ggcccttgat	60
tccttcatgg atgatcgctt tcataaaaaa attccccca ttcgagttgg ttgtgttaaa	120
ttatggacat gaatgaaggt aaatgtaaaa tgattgccc gggccgctt agaggccttc	180
tgtttataa aggattgcaa tgaggcggaa attccattag tgtaatacag aagcaagcta	240
gcaagtgaag gagatggaac atgagtttc acgatcaaaa tattttacct gcggtacgca	300
atatgaagca gttcgataca ttcctggaca gcccttttc atacggggtg ctgcttgaca	360
tccatcttgg acagctggga ggcgtgatca gcgcggcaag atcccatggg aaaaaaatgt	420
ttgttcacgt cgatctgatc caaggaatta agcatgatga atacggtgcg gaattcattt	480
gccagggaaat gaaaccggcg ggcattctt ctacgagatc aagcgttatc gccaagcaa	540
agcagaagaa agtgtatgcg atccagcgca tgttttaat agacacaagc gccatgaaga	600
agagcattga attggtgaaa aagcacagac ccgactatat agaagtgcctt cccggagtag	660
tgccggaatt gatcagggaa gtcaaagaaa taaccggcat tccgatctt gcggcgggt	720
ttatccgtac cgaaaaagac gtcgagcagg cgcttgcagc aggggcgtcc gcagtcacca	780
cctcagacac tgatttatgg aaaaaatact ggaactaaaa atttaaaatg tgaaaaatta	840
ttgacaacgc tttcaactata cgatacgatc ttactaagtt aatacattgt gacggagacc	900
cgagaccac agcagttctt tactcagtat gatgtaaaga aagtttgctg tgttttta	960
tggctttta gacacagtgg agaaggtgaa cttatggcgt tcatacttta gaataatact	1020

0
1
2
3
4
5
6
7
8
9

tcataataga ttttaggagg gatagccttg acagcattt ggggggaagt tatcggaacg	1080
atgctgctca tcgtctttgg agctggagtt tgtgcaggag ttaatttcaa aaaatcgctg	1140
tcccatcaat ccggatggat tgtgatcgct ttcggctggg ggcttggcgt ggccatggcg	1200
gtatatgccg tcggcggcat cagcggagcg cattaaatc cgccgttac attggggctg	1260
gcatttgcg gagatttcc ttgggaagaa gtgccttcat atattttggg acagatgatc	1320
ggcgcattt taggagcggt gctcggtttt cttcactact tgccgcactg gaaagaaacc	1380
gaggatcaag gcgcgaagct tggagtattt tcgacaggc tcggcattcc aaatacattt	1440
gcaaacctgt tcagtgaaac attggggact tttattctcg ttctcgact tttaacgatc	1500
ggtgcaaaca agtttactga cggactgaat cctcttggt tcggatttct gatcggtgg	1560
atcggtatct cgctcgccgg aacaacaggc tatcgattt accctgccc cgatctgggg	1620
ccgagaattt cccattttgt cttccgatt gcaggcaag ggagttcaaa ctggaaagtac	1680
gcgtggatcc ctgttttagg accggcgctt ggccgttcat ttgcaggcgt ttttacaac	1740
gccgtattca aaggcataat cacaaacaca tttggattt taagcgatc actagttgt	1800
atattgttag gtttcttatat tcataatgaaa aaacaaggcag ttgatcaatc ggtcaacattt	1860
taaaaaaaaaaag caatcttaac agacatataa gggggagttt caaaatggaa aagtacattt	1920
tgtctcttga tcaaggcacc acaaggcaca gggcgattgt tttcaacaaa gcaggcgaaa	1980
tcgtccatat tgcgcaaaag gaattccagc aatattttcc aaaccccgcc tgggttgaac	2040
acaatgcaaa cggaaatctgg ggctctgttc tgccgttgcgat cgcttcagcg ctggcataat	2100
cggggatcga agccggacaa attgccggaa tcgggatcac aaaccagcgg gaaacgaccg	2160
tggtttgggaa taaacatacc ggcaaaaccgg tctacaacgc gattgtgtgg cagtcccgcc	2220
aatcggttga gatatgccag gaattaaaag agaaaggcta tgaagagacg atcagagaaaa	2280
aaacaggcgat tttatcgat ctttattttt caggcacgaa agtggaaatgg atcctggatc	2340
atgtggaaagg ggcaaggcgaa aaagccgaaa acggcgaccc tctcttcgggt acgatcgatt	2400
cttggctgtat ctggaaaatg tccggcggaa aagcgatgt gacagattat tcaaacgcct	2460
caagaacatt gatgttcaac atctatgacc taaaatggaa tggatcaactt ctcgatattc	2520
tcggcgtgcc gaaatcgatg gttccggaa tcaaggcattt atcgatgtt tacgtggaaa	2580
cggtcgatata tcatttcttc ggcaaaaaca ttccgattgc aggtgcagcc ggcgaccagc	2640
aggcagcatt gttccggcag gtttgctttt aagaaggaat ggttaagaac acgtatggaa	2700
caggctgctt tatgctgatg aacaccggcg agaaagcgat taaatcagag cacggcctgc	2760

tgacgacaat	cgcttggggc	atcgacggaa	aggtggaata	tgcgctggaa	ggcagcgtct	2820
tcgtcgccgg	ttccgctatt	caatggctgc	gtgatggct	gagaatgtt	aaagacgcca	2880
aagaaagtga	aaaatacgct	gtaagagcaag	aatctgccga	ttgtgtttat	gtggtccctg	2940
cattttagg	tttaggcacg	ccttattggg	acagcgatgt	ccgcggcgct	gtattcggac	3000
tgacccgggg	tacgacgaaa	gagcattta	tcagagcaac	gcttgaagcg	cttgcttatac	3060
aaacgaaaga	cgtgctggac	gcaatgaagg	aagactccgg	gatcccggtt	aaaacgctga	3120
gagtcgacgg	cggagctgtc	aaaaacaact	tcctgatgga	tttcagggc	gacattttag	3180
atgtccctgt	agaacgtcct	gaaatcaatg	aaacaacagc	gcttggttca	gcctatttag	3240
cgggccttgc	tgtcgcttc	tggagcgatc	gttccgagat	caaagaccag	tggcagcttg	3300
acaaacgttt	tgaaccgaaa	atggaagaaa	aagagcgtga	gagcctgtac	aacgggtgga	3360
agaaaagctgt	aaatgcagct	agggctttta	aataagctgc	atgtatgtt	caatctaatt	3420
aagttaatag	aaacggttgg	agaagaggag	agaccgcaga	caccaaagca	gtatcagcgc	3480
tttggatgtt	tgtggctct	ttttcttattt	tttaccgtga	caacaaggga	ggacatgaaa	3540
catggaatca	ttattttcaa	gccgtaaacg	ggacgacatt	ttacagaata	tgacgaagca	3600
gaagtatgac	gtgtttatta	tcggcggagg	tattactggg	gctgggacgg	cattggatgc	3660
cgcatcgcbc	ggaatgaaaa	cggcgctttg	cgaaatgcag	gactttgcag	ccggaacgtc	3720
aagccgttcc	acgaaacttg	tacacggcgg	gcttcgttat	ttaaagcaat	ttgaagtgaa	3780
aatggtagcc	gaggtcggca	aagagcgggc	gatcgtctat	gaaaacgggc	cgcacgttac	3840
aacccccgaa	tggatgctgc	ttccgatgca	taaggaggg	actttcggca	aattcagcac	3900
ttcaatcgga	ctgagggtgt	acgacttttt	ggcaggcgtc	aaaaaagctg	agcggaggag	3960
catgctgact	gccgaagaaa	cgtttcaaaa	agagccgctc	gtaaaaaaga	acggcctgaa	4020
ggcgccggc	tattatgtcg	aataccggac	ggatgatgcc	agattgacga	tcgaagtcat	4080
gaaagaagcc	gttaaattcg	gagccgaggc	cgtcaattat	gcaaaagtaa	gcgattttat	4140
atatgaaaac	ggcaaggtca	ccggcgtgg	cattgaagac	gtcttcacga	aaaaaacgta	4200
ccgcgtctac	gcgaaaaaaaa	ttgtcaatgc	cgcggggccg	tgggtcgacc	gtctgcggga	4260
aaaagaccat	tcaaaagaag	gcaaacacct	tcagcataca	aaaggcgtgc	atcttgttt	4320
tgatcaatcg	gtcttcctt	taaaacaagc	cgtttatttt	gatacgcctg	acggccgcat	4380
ggtgttcgcc	attccgagag	acggaaaggc	atatgtcggc	acaacagaca	ccgtctacaa	4440
cgagaatttg	gaacaccctc	gaatgacgac	agcagacagg	gattatgtca	tcaatgcaat	4500

10
9
8
7
6
5
4
3
2
1

caactatatg ttccctgaac ttggaatcaa agccgaagat gtcgaatcaa gctgggctgg	4560
cctcagaccg ctgattcatg aagaaggaaa agaccgtcc gagatttccc gaaaagatga	4620
gatctggact tctgaatccg gactgatcac gatcgccggc ggaaagctga caggctacag	4680
aaaaatggct gagcatatcg tcgatcttgt cagagaccga ttaaaagaag agggcgacag	4740
agacttcggg cttgcagaa caaaaacgt gccgattca ggcggccata tcggcggctc	4800
caaaaatctg gaggctttta ttcaagcgaa agcagccgaa gggattgagg ccggactgtc	4860
cgaagagacg gccaaacaaa tcgcccacg atacggttcg aacgcagacc gcctgttga	4920
tcgtattcca tcgctgaaag atgaagcagc aaaacgcccgc atccctgtcc atgtactagc	4980
agaaaatggat tacggatcg aggaagaaat ggcagccgtc ccggcagact tcttcgtccg	5040
cagaaccggc ggcgtgttct ttgacatcaa ttgggtccgc acttacaaag agagcattac	5100
ggactacatg agcgagaagc tgaactggg tggcgaaacg aaggcccgc atgtcaaggc	5160
atttggaaagga ctactacacg atgctgttgt cccgctggaa agcaaatgtat ttatttaggtc	5220
aaataaacctt ggtgaatttt cgtaataat caatcgaatg gccccggcgtg aggctgtt	5280
gaacaggcag ctcattttt ttcatggc atgctaaatt tggacaaagc ggcgtttgt	5340
cgatatgata aaagaaaagc tgcaattact tagctagaac attggaggta atcatgagct	5400
ggagaacgag ctatgaacgc tggagaaaca aagaaaactt agattccgaa taaaagcgc	5460
ttcttttggaa agcggaaagga aatgaaaaag aactagagga ttgcttttat aaaaaacttg	5520
agtttggta cgcggatcg cgcgttgaga tcggaccggg cccgaaccgc atgaacgttt	5580
atacggttcg caaagcatcg gcgggccttg ccgcatacat aggagcgaac ggcggcgaag	5640
caaaaagcg cggcgttgt atcgctacg attcccgcca caaatcgccct gaatttgcaa	5700
tggaaagctgc taagacgctc gcagaaaacg gcgttcaaac gtacgtgttt gagcgtaact	5760
g	5761

<210> 27
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 27
gactgaattc gcaatttgaa gtgaaaatgg tagc

34

<210> 28

DNA Sequence

<211> 33	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 28	
gactggatcc agatctcatc ttttcggaa atc	33
<210> 29	
<211> 56	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 29	
gactgaattc agatctgcgg ccgcacgcgt agtactcccg gcgtgaggct gtcttg	56
<210> 30	
<211> 32	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 30	
gactaagctt cagttacgct caaacacgta cg	32
<210> 31	
<211> 47	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 31	
ccgagatttc ccgaaaagat gaaatttggc cttctgaatc cgactg	47
<210> 32	
<211> 50	
<212> DNA	
<213> Artificial Sequence	
<220>	
<223> Primer	
<400> 32	
gactaagctt agatctgcta gcatcgattg attattaacg aaaattcacc	50

	<210> 33 <211> 31 <212> DNA <213> Artificial Sequence <220> <223> Primer <400> 33 gactaagctt gtgaaggaga tggaacatga g	31
	<210> 34 <211> 64 <212> DNA <213> Artificial Sequence <220> <223> Primer <400> 34 gactggatcc agatctgcgg ccgcacgcgt cgacagtact attttagtt ccagtattt ttcc	60 64
	<210> 35 <211> 32 <212> DNA <213> Artificial Sequence <220> <223> Primer <400> 35 gagctctaga tcttcggcgga catcagcgga gc	32
	<210> 36 <211> 28 <212> DNA <213> Artificial Sequence <220> <223> Primer <400> 36 gactgaattc ctttgcgca atatggac	28
	<210> 37 <211> 58 <212> DNA <213> Artificial Sequence <220> <223> Primer	

0
0
0
0
0
0
0
0
0
0
0
0
0
0
0
0

<400>	37					
gagctctaga	tctgcttagca	tcgatcccgcg	gttaaaatgt	aaaaaaattat	tgacaacg	58
<210>	38					
<211>	1500					
<212>	DNA					
<213>	Bacillus licheniformis					
<400>	38					
atcagcgata	gggctcgcat	cgacagaccg	gatttcatcc	ggccaatggc	gggatgacgg	60
gctggtcatc	aggtcgacat	ccggcgatca	gtttaatgcc	attgaccctg	atctggtcat	120
tgacaaaagac	ggaaagccct	ggctctcatt	cggttccttc	tggagcggca	ttaagctgac	180
aaggcttgat	aaaaaacacga	tgaaaccgac	gggaagcctg	tattcgatcg	cctcaaggcc	240
gaataacgga	ggagcggttg	aagccccgaa	cattacctac	aaagacggct	actattactt	300
atttgtctcg	tttgacagct	gctgcaaagg	ggtggacagc	acatataaaa	tagcctatgg	360
ccgttcaacg	agcattacgg	gaccctatta	tgataaaagc	ggcaaaaata	tgatgaacgg	420
cggagggacg	atcctggact	ccoggcaatga	ccgctggaaa	gggcgggac	atcaggatgt	480
tctgaacaac	tcgatccttg	tcaggcatgc	ttacgacgct	ctggacaatg	gtgtatcaaa	540
gctgctcatc	aatgacttgt	actgggattc	ccaaggatgg	ccgacttatt	aacagcagat	600
gacggggcgt	ttccgcccgg	ttttttttgt	tctgaaatct	gtcaaaaaaaaa	aataaaaaac	660
ataccggaaa	ttaaattgac	agtttttttc	ataatgatat	aatgaagtgg	ttcgtacaaa	720
tatgttttt	atgttagttg	tacgtacata	taatcgcat	acagttttag	atcaaggtat	780
gatttatgtt	ttttgttaag	cgttttaata	gtttgctatt	ctacacagac	accataaaga	840
cgaggaggag	gaagctattt	gattcaggca	aagacgcatt	tgttttggtt	tgtgacaggc	900
agccagcatt	tatatggcga	agaggcggta	caagaggtag	aagacgattc	caaaatgatc	960
tgcaacggat	taaatgacgg	agatttaagg	tttcaagtgc	agtacaaaagc	ggtggccact	1020
tcgctggacg	gcgtcagaaa	actgtttgaa	gaggcgaacc	gggacgatga	gtgcgcaggc	1080
atcatcacct	ggatgcatac	gtttcacccg	gccaaaatgt	ggattcccg	ccttccgag	1140
ctgaataagc	cgctgctcca	tttcataacc	cagtttaacc	gggacattcc	gtggataaaa	1200
atcgacatgg	atttcatgaa	tattaatcag	tctgcccacg	gcgaccgcga	atacggtttt	1260
atcggagcga	gattgggcat	tcctcgaaaa	gtaatcgccg	gatattggga	agacagagaa	1320
gtaaaagcgct	cgatcgacaa	atggatgagc	gcagcggctcg	catatattga	aagccgccat	1380
atcaaagtcg	cccgatttg	ggacaacatg	cggaatgtgg	cgtaacaga	aggagataag	1440

attgaagcgc agattcagct tggctggtct gtcgacggat atggaatcg^c cgatctcg^tc 1500

<210> 39
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 39
gactaagctt catccggcga tcagtttaat gc 32

<210> 40
<211> 65
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 40
gactgaattc agatctgcgg ccgcacgcgt cgacagtact atttttttt gacagattc 60

agaac 65

<210> 41
<211> 37
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 41
gactggatcc agatcttagtc gagtacaaag cggtg^g 37

<210> 42
<211> 31
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 42
gactgaattc gaccagccaa gctgaatctg c 31

<210> 43
<211> 4078
<212> DNA
<213> *Bacillus licheniformis*

<400> 43	
tttccggcgt agcacccgaa gcgaacctat taatcgtaa ggtgctcggc ggtgaagacg	60
gcagccccaa ttatgaatgg atcatcaacg ggatcaacta cgccgtttag caaaaagccg	120
acattatttc aatgtcgctc ggccgtcctg ccgacgttcc ggagttgaag gaagcggtga	180
caaacgcccgt gaagagcgga gtgctcgtcg tctgcgccgc aggaaacgaa ggcgacggca	240
atgaccgtac agaggagtac tcataccctg ctgcatacaa cgaagtcatc gccgtcggat	300
ccgtgtcatt gacgcgttag tcttccgaat tttcaaatgc gaacaaagaa attgaccttg	360
ttgcacctgg agaagaaaatc ctctctacat tgcccgcacca tcaatacgga aagctgacgg	420
gaacatcgat ggctacacccg cacgtcagcg ggcgcgtcgc tctcatcaag tcagctgaag	480
aagaggcggt taaacggaaa ctgacagaac ccgaactgta tgctcagtttta atccggccca	540
cccttcctct tgattactca aaagcgctga tcggcaacgg attcttataat ttgtcagcgc	600
cggaggtact ggcggaaaaaa gccggcgaag caaaacttct ttcccttaa cagtctaaag	660
gaggctgccg acaatgtcgg cggcctttt catggccatg tataaagctg aatctttta	720
attgcaagaa ttcaaaaatt attttgcata aaagatcgcg gcggtatata atctactaaa	780
caatttcatc gccgggaaca tggtaatcta acgaggttag attttaaaag ggaagtttgg	840
tgaaaatcca acgcggtccc gccactgtga atgaggaggt tatttcataa aaccactgt	900
ttctatatgg gaagggggaa ataaccgtcg attcatgagc caggagacct gcctgttctg	960
acgcaccata aacctacggt cgataggagg tggtcgagtt gacgtaacaa tcgctacgtt	1020
tatttcgt tcgcaacatg ctgtttcag gcattcacct tctcattgtc cgaagtgtga	1080
gtgtctttt ttattgaaca ctaaaaggag gagaccagac atgactaatg taaaaacgag	1140
cagcttggc tttccaagaa tcggcttggaa cagagaatgg aaaaaatcgc ttgaggctta	1200
ttggaaagga aacacggacc gcgagacctt tttgaaagaa atggatgaac aatttttagc	1260
agcgctccag actcagcttgc atcagcaaat cgatatcata ccggtttccg actttacaat	1320
gtacgaccat gttcttgaca cggcggtgat gttcaactgg attccagatc gattcaagga	1380
tataaacgat ccgttagata ctatattcgc aatggcgaga ggcacgaaag atgctgtatc	1440
gagtgaaatg acaaaatggt ttaatacataa ctaccattat attgtgcctg aatatgaaaa	1500
aggtgcacaa taccgcgtga cgagaaacaa accgcttcaa gattacaaa gagcaaaagc	1560
agcattggaa acagaaacga agccgcgtcat actcggcctt tacactttcg tagcccttgc	1620
aaaaggctat gaacaacagg atattaaaga tatttataac caaatgacac ctctttacat	1680

卷之三

atccactaca aacgccccct gttcacacgg gcggctcttt tcatggctcc agccctttt 3480
aggccaaaag aaccgttata caaggtatgt ccgcggaaaa aacattaaga cttttgattc 3540
attcgtacga ttcccttccg tatcctttc ttttaacata tttgttagtag atgatggaag 3600
ggaaggaaaa tatgttagtga ttgacgttgg aatagcgta gaacgaaaaa tcaagcgaaa 3660
aatatatcag gaagacattc actctttca gctatacgta aaagatgtga atgccgcat 3720
tgatgagctg aggccaggaaa gttcttctat tttaaaagca caccaaacgt atatcaacgg 3780
atggcgccga caggcgccgaa aatgttatga cgcgctttt gacgatctcg accgggcccga 3840
atcgcgctg tatgacaaggc tgaggaccat taaagagcag gcggacgaag aaattgaacg 3900
gcttcagctg aaagccgagg agctgatatg acgatccggc tgaacatcaa tgatctgcac 3960
gccctcgccc gccaatttcg ttattccac cagcgaatca gcgatttaat acgcctttt 4020
aaccgtcatt ttcatggttc ttttctccag cgtaaaaaca gcaaggaaca tgcggcat 4078

<210> 44
<211> 42
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 44
aaaaaaaccccg agtttcacaa aaaatccact acaaacgccc cc 42

<210> 45
<211> 41
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 45
tttttttaa gcttatgccc catgttcctt gctgtttca c 41

<210> 46
<211> 32
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 46
aaaaaaaaatcg attcaggat ataaacgatc cg 32

<210> 47
<211> 45
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer

<400> 47
ttttttttt ccatcgact gggatatcag ctcttcataa gcac 45

<210> 48
<211> 3952
<212> DNA
<213> Bacillus licheniformis

<400> 48
tttatacggtt tccctctcggtt caatcgaggc ctacacgaca ccaagctacg agctgagcct 60
ggcgaataaaa atggtaagc tgtttatgct gatattggtg ggcgtttta aagtggaggg 120
atttgtcatc ggattaacga ttcttaactat agtgtatgact tcgatcaggt cattgcgaac 180
gccttactta tggcctctcc tcccggttcaa tggaaaagcg ttttggcatg ttctcgtgcg 240
cacgtccgtt ccagggggaa aagtcaggcc gagcatcggtt catccgagaa accgctccag 300
acagccgtga agccggcatt cgaagaggct tttccccggg gaaaagccctc ttttcaata 360
atcgaattcc ggtctttgag taccgatgcc tttgtattca ttggcagaga tcgcgactgc 420
ccggaggctg cagatgttgt tctgtcttct gatcgatag acgacataca gcatttcgcg 480
gccgtacggg tcaatcggtt acgaatgaag gaaaacctca gttcctctcc gccaaaatct 540
cgtattcgcc ggagctgtaa taatctgccc ttcataaggc tcataaattc tctgttcata 600
atgcgcagcc ggctgataag gggcgtataac atcttcaggt gcatagccgg gagcgggggt 660
gtagggataa cgatttggat acatatgata acctcttcc cacttcgttt tttggtttcc 720
atctttaaga ttatattcag gtaaatgcct atttgtatgg gcgaaaatct cagctttcg 780
gctctttttt tattgaatgg acgttggta tgcctatttc tatcaagcgc tgtttctgt 840
tattctataa tcaatagaat ggatttagttg ttttagggat catttcctt ataataatcaag 900
aaaatttggaa caaatgggg 960
tcgcactatac atgaagccgg aagatgcattc gggcagcaac cggagcgc cttgcaccc 1020
tgtcgataga gaaagaggga atgacaattt 1080
agagggcacc tcgaaatcgg cgggtgtcgat gttctatcat tggcagaaag atacggaaaca 1140
cctctttatg tatacgatgt cgccgtgatt agagagcgc cccgaaaatt ccagaaggca 1200

NATIONAL INSTITUTE OF MEDICAL SCIENCES

ttcaaggaag ccggtttaaa agcgaggta gcgtatgcaa gcaaggcgtt ttcatcggtt	1260
gccatgattc agcttgccga acaagagggg ctgtctctgg atgtggtatac gggaggagag	1320
cttttactg cgatcaaagc agggttccca gctgagcggta ttcattttca cgaaacaat	1380
aagagccctg aagaacttagc catggcgctg gagcatcaaa tcggctgcat cgtgctcgat	1440
aactttcacg agatcgccat tacagaagat ctttgcagc gatcaggaca aactgtagac	1500
gttttgctca gaatcactcc gggagttgaa gcgcacacgc acgattatat tacgacgggg	1560
caggaagatt ccaaattcgg ttttgatctg cataatggac aggtcgaaca agccatcgaa	1620
caagtccgccc gctcgctgc gtttaagctc ctcggcgtgc actgccacat cggttcgcaa	1680
attttgata cggcaggatt tgtccttgca gcagacaaga ttttcgagaa gcttgcggaa	1740
tggcgggaga cttactctt cattccggaa gtgctcaatc ttggcggggg cttcgccatc	1800
cgctatacaa aagacgacga gocgcttgca gctgatgttt atgttggaaa aatcatcgag	1860
gcggtaaag caaatgccga gcatttcggc tttgacatcc ctgagatttg gatcgaacca	1920
ggccggcttc tcgtcggtga tgccccggact acgctgtaca cgatcggttc tcaaaaagag	1980
gtgccgggca ttgcgaaata ttagccatc gacggcggca tgagcgataa tatcaggccg	2040
gchgcttatg aggcaaaata tgaagcagcc gtcgccaaca ggtgaacga tgcttgtcat	2100
gataccgcat caatcgccagg aaaatgctgc gaaagcggag atatgctgat ttgggatttg	2160
gaaatccccg aagttcgcga cggagatgtg ctgcgcgtt tctgcaccgg tgcgtacggc	2220
tacagcatgg ccaacaacta caaccgcatt ccgcggccgg ccgtcgctt tgcgaggac	2280
gggaaagcgc agctcgcat tcagagagag acgtatgagg atatcgtaa gctggatctg	2340
ccgctgaaat cgaaagtcaa acaataaaaaa aatggagatt ccctaagagg ggggtctcca	2400
tttttaattc aagcacgaaa aacacttccc ggtgatcggg aggtgtttt tgtaaaaaag	2460
atcatgacat gcatagaaca gcgaccgggc tagttgtata taatattgtg aatttaacaa	2520
aaaatttaca aaggagatga taaaggcaat gaccagggtg aaaaggatga gatttgctga	2580
tttggat tttagggcg agtagatgaa accggccaaa gtatccctac tccaccgatt	2640
gctccagtgc ctgaagcaat gtgttggattg taacacagta aatcgttta cagcaataaa	2700
cattttgtg aatattttat tgattttggc tgtgatctca ttcccatatt ctgctgcggc	2760
ccatggcgca acacagtccg gcgatcaata ttcaagctt gaagaattgg agcggaaatga	2820
agatccagct tcttaccgaa ttacggagaa gaacgcaaga gtgccatgc tcatacatggc	2880
catccatgga ggcggcatcg aacccggaaac gagcggaaatc gccaaatgaag tgtccaaaaa	2940

REVIEWED

ctattccctg tacttgtttg aaggcgtgaa atcatcaggc aatacggacc ttcacattac	3000
aagcacgcgt tttgacgagc cagcggcgct cgcaattact gcaagccacc agtatgtcat	3060
gtcgctccac ggcttattaca gtgaagaccc cgatattaaa gtaggcggca cagaccgcgc	3120
taaaaatcaga atattggttg atgagctgaa ccgctcgcccc tttgccgctg aaatgctggg	3180
gacagatgac aagtatgccc gaacccatcc gaataacatc gccaaacaagt cgcttccgg	3240
gctgagcatt cagcttgaaa tgagcacggg tttccgcaaa tctttattcg accggtttac	3300
actaaaagac agggcggcga cgcaaaacga aacgtttac cgatttacaa agctgctgac	3360
agattttatt catgaaaact atgaagaaga cggagggat ttcccctctg caaaaataaa	3420
acacccctt caagtgaaaa aaggaggtgt ttcggcggtt gtgttaaccg ttggactctg	3480
aggtgccgccc gccggtaat acggaaacga tggcggtcca cagagacaca aagaagtcga	3540
ttagttttt aagaaagttt tgtccttctt cagaatccaa gaatttcgtg attttatcct	3600
ttgctttgtc aagctggtct ccaacctggt tccagtcgtat attaatattt ttcatgttat	3660
taaataaaaga tataagagag ttttctgtat cttctgttag tgcacgcca agttcggaaag	3720
cagccgaatc aatcgtttc tccaattcct ctttgactc gggactccg ttttcgaga	3780
tttcttcctt gactttggcc atcagcgctg acgcgttttc actgccgatt ttctcgccaa	3840
gctctgaagt ggtgacaagc tcttcattcg cgacccttt cacatctcg gaaattttt	3900
cgcccgaaagt cgtttcatac gctttcatca atccggttaa agcggctgtg cc	3952

<210> 49
<211> 6837
<212> DNA
<213> Plasmid pMOL1642

<220>
<221> misc_feature
<222> (669)..(669)
<223> n denotes an undetermined nucleotide

<400> 49 gatcttcctt caggttatga ccatctgtgc cagttcgtaa tgtctggtca actttccgac	60
tctgagaaac ttctggaatc gctagagaat ttctggaatg ggattcagga gtggacagaa	120
cgacacggat atatagtggaa tgtgtcaaaa cgcataccat tttgaacgtat gacctctaatt	180
aattgttaat catgttggag ctcagtgaga gcgaagcgaa cacttgattt tttaattttc	240
tatctttat aggtcatttag agtatactta ttgtcctat aaactattta gcagcataat	300

1000
900
800
700
600
500
400
300
200
100

agatttattg aataggcat ttaagtttag catatttagag gaggaaaatc ttggagaaat	360
atttgaagaa cccgaggatc catgctgtcc agactgtccg ctgtgtaaaa aataggaata	420
aaggggggtt gtttatttt tactgatatg taaaatataa tttgtataag aaaatgagag	480
ggagaggaaa catgaagaag attgcaattt cgccgattac agcgacaagc gtgctggctc	540
tcagcgcatg cagccccccg gattctgagg ttgtgcgg aacaaaagct ggaaatatta	600
caaaagaaga cctttatcaa acattaaaag acaatgccgg agcggacgca ctgaacatgc	660
ttgttcagna aaaagtactc gatgataaat acgatgtctc cgacaaagaa atcgacaaaa	720
agctgaacga gtacaaaaaa tcaatgggtg accagctcaa ccagctcatt gacaaaaag	780
gccaagactt cgtcaaagaa cagatcaaattt acgaacttct gatcaaaaaa gccgaaagg	840
ataacataaa agtaaccgat gatgacgtaa aagaatatta tgacggcctg aaaggcaaaa	900
tccacttaag ccacattttt gtgaaagaaa agaaaaacggc tgaagaagtt gagaaaaagc	960
tgaaaaaagg cgaaaaattt gaagaccttg caaaagagta ttccgtaccc gggcttagag	1020
tcgacgcggc cgcaaccatt tgatcaaagc ttgcattgcct gcaggtcgat tcacaaaaaa	1080
taggcacacg aaaaacaagt taagggatgc agtttatgca tcccttaact tacttattaa	1140
ataatttata gctattgaaa agagataaga attgtcaaa gctaataattt tttaaatcgt	1200
caattcctgc atgttttaag gaattgttaa attgattttt tgtaaatatt ttcttgtatt	1260
cttgcgttaac ccatttcata acgaaataat tatactttt tttatcttg tgtgatattc	1320
ttgattttt tctacttaat ctgataagtg agctattcac tttaggtta ggatgaaaat	1380
attctcttgg aaccatactt aatataaaaa tatcaacttc tgccattaaa agtaatgcca	1440
atgagcgaaa tgtatttaat aatcttttag caaacccgta ttccacgatt aaataaatct	1500
cattagctat actatcaaaa acaattttgc gtattatatc cgtacttatg ttataaggta	1560
tattaccata tattttatag gattggtttt tagggaaattt aaactgcaat atatccttgt	1620
ttaaaacttg gaaattatcg tgatcaacaa gtttattttc ttttttttgc cataatttt	1680
ggcttatttc aatggcagtt acgaaattac acctctttac taattcaagg gtaaaatggc	1740
ctttccgttca gccgatttca aagatattat catgttcatt taatcttata ttgtcattt	1800
ttttatctat attatgtttt gaagtaataa agtttgact gtgtttata tttttctcgat	1860
tcattataac cctctttaat ttgggttatat gaattttgct tattaacgat tcattataac	1920
cacttattttt ttgtttgggtt gataatgaac tgtgctgatt aaaaaatgac taaaatgccc	1980
catattttt cctccttata aaatttagtat aattatagca cgagctctga taaatatgaa	2040

同上

catgatgagt gatcgtaaa ttatactgc aatcgatgc gattattgaa taaaagatat	2100
gagagattta tctaatttct ttttcttgt aaaaaaagaa agttcttaaa ggtttatag	2160
tttggcgt agagcacacg gtttaacgac ttaattacga agtaaataag tctagtgtgt	2220
tagactttat gaaatctata tacgttata tatatttatt atccggaggt gtagcatgtc	2280
tcattcaatt ttgagggttg ccagagttaa aggatcaagt aatacaaacg ggatacaaag	2340
acataatcaa agagagaata aaaactataa taataaagac ataaatcatg aggaacata	2400
taaaaattat gattgatta acgcacaaaa tataaagtat aaagataaaa ttgatgaaac	2460
gattgatgag aattattcag ggaaacgtaa aattcggtca gatgcaattc gacatgtgga	2520
cggactgggtt acaagtgata aagatttctt tgatgattta agcggagaag aaatagaacg	2580
atttttaaa gatagcttgg agtttctaga aatgaatac ggttaaggaaa atatgctgta	2640
tgcgactgtc catctggatg aaagagtccc acatatgcac tttggttttg tcccttaac	2700
agaggacggg agattgtctg caaaagaaca gtaggcaac aagaaagact ttactcaatt	2760
acaagataga ttaatgagt atgtaatga gaaaggttat gaactgaaa gaggcacgtc	2820
caaagaggtt acagaacgag aacataaagc gatggatcag tacaagaaag atactgtatt	2880
tcataaacag gaactgcaag aagttaaagg tgagttacag aaggcaaata agcagttaca	2940
gagtggaata gagcatatga ggtctacgaa acccttgat tatgaaaatg agcgtacagg	3000
tttggttctt ggacgtgaag agactggtag aaagatatta actgctgatg aatttgaacg	3060
cctgcaagaa acaatctttt ctgcagaacg gattttgat gattacgaaa atattaagag	3120
cacagactat tacacagaaa atcaagaatt aaaaaacgt agagaggtt tgaagaagt	3180
agtgaataca tggaaagagg ggtatcacga aaaaagtaaa gaggttaata aattaaagcg	3240
agagaatgat agttgaatg agcagttgaa tgtatcagag aaatttcaag ctagtacagt	3300
gactttat cgtgctgcga gggcgaattt ccctgggtt gagaaagggt ttaataggct	3360
taaagagaaa ttcttaatg attccaaatt tgagcgtgtg ggacagttt tggatgtgt	3420
acaggataat gtccagaagg tcgatagaaa gcgtgagaaa cagcgtacag acgatttata	3480
gatgttaggg tactttatg ccgagaaaac ttttgcgtg tgacagtcct taaaatatac	3540
ttagagcgta agcgaaagta gtagcgacag ctattaactt tcggttcaa agctctagga	3600
tttttaatgg acgcagcgca tcacacgcaa aaagggaaatt ggaataaaatg cgaaatttga	3660
gatgttaatt aaagacctt ttgaggcttt tttttcttag atttttgggg ttatggg	3720
gagaaaaacat aggggggtac tacgacctcc cccctaggtg tccattgtcc attgtccaaa	3780

2020-09-10

caaataaaata aatattgggt ttttaatgtt aaaaggttgt ttttatgtt aaagtgaaaa	3840
aaacagatgt tgggaggtac agtgatggtt gtagatagaa aagaagagaa aaaagttgct	3900
gttactttaa gacttacaac agaagaaaat gagatattaa atagaatcaa agaaaaatat	3960
aatattagca aatcagatgc aaccggattt ctaataaaaa aatatgcaaa ggaggaatac	4020
ggtgcatttt aaacaaaaaa agatagacag cactggcatg ctgcctatct atgactaaat	4080
tttgttaagt gtattagcac cgttattata tcatgagcga aatgtataa aaagaaaactg	4140
aaaacaagaa aaattcaaga ggacgtaatt ggacatttgt tttatatcca gaatcagcaa	4200
aagccgagtg gttagagtat taaaagagt tacacattca attttagtg tctccattac	4260
atgataggga tactgataca gaaggttagga tgaaaaaaga gcattatcat attctagtga	4320
tgtatgaggg taataaatct tatgaacaga taaaaataat tacagaagaa ttgaatgcga	4380
ctattccgca gattgcagga agtgtgaaag gtcttgtgag atatatgctt cacatggacg	4440
atcctaataa atttaaatat caaaaagaag atatgatagt ttatggcggt gtagatgttg	4500
atgaattatt aaagaaaaca acaacagata gatataaatt aattaaagaa atgattgagt	4560
ttattgatga acaaggaatc gtagaattta agagtttaat ggattatgca atgaagttt	4620
aattttagtga ttggttcccg ctttatgtg ataactcgcc gtatgttatt caagaatata	4680
taaaatcaaa tcggatataa tctgaccgat agatttgaa tttaggtgtc acaagacact	4740
ctttttcgc accagcgaaa actggttaa gccgactgcf caaaagacat aatcgactct	4800
agaggatcct tttagtccag ctgattcac ttttcgcatt ctacaaactg cataactcat	4860
atgtaaatcg ctcctttta ggtggcacaa atgtgaggca ttttcgcctt ttccggcaac	4920
cacttccaag taaagtataa cacactatac tttatattca taaagtgtgt gctctgcgag	4980
gctgtcgca gtgccgacca aaaccataaa acctttaaga ccttccttt ttttacgaga	5040
aaaaagaaac aaaaaaacct gccctctgcc acctcagcaa aggggggttt tgctctcggt	5100
ctcgttaaa aatcagcaag ggacaggttag tatttttga gaagatcact caaaaatct	5160
ccacctttaa acccttgcca atttttattt tgtccgttt gtctagctt ccgaaagcca	5220
gactcagcaa gaataaaatt tttattgtct ttccgtttc tagtgtaacg gacaaaacca	5280
ctcaaaataa aaaagataca agagaggtct ctcgtatctt ttattcagca atcgcgccc	5340
attgctgaac agattaataa tgagccgcgg atatcgatgc cttgtcagag agattcctga	5400
agagcggcag gataaggtat tttagaatgat taatgtgctg atcttaattt tattgatctc	5460
atcattcatt gagatttcct ttacgggtgt aagaaaaagg atagctgccc atcgtattga	5520

tccggcagct atcctttgt ttatttagcat atccaagaag caccaataat aattaataag 5580
 atgaacagca ccacaaggcag cgcaaagccg ccagcgaaac ctcctgcata accgtcgccc 5640
 atattgacac ctcctctgcc ccagtcgtta cattagtgtt tgcacgaatg tcataaaccg 5700
 attaggctat cgtccaaaag aaaagaaccg cctgaaaaaa tgacggttct tttctcattt 5760
 tctaaggttt tagtacagat aagctgcacc aacgatgatt aataaaatga acaacacgac 5820
 caataaagca aaaccgcttg agtatacctcc gctcatgtt tgcacctcgaa attctgatca 5880
 aatggttcag tgagagcgaa gcgaaacctt gatTTTAA tttctatct tttataggc 5940
 attagagtat acttatttgt cctataaact atttagcagc ataatacgatt tattgaatag 6000
 gtcatttaag ttgagcatat tagaggagga aaatcttggaa gaaatatttggaaacccgaa 6060
 acgcgtgagt agttcaacaa acggggccagt ttgttgaaga ttagatgcta taattgttat 6120
 taaaaggatt gaaggatgct taggaagacg agttattaaat agctgaataa gaacggtgct 6180
 ctccaaatat tcttatttag aaaagcaaataat ctaaaattat ctgaaaaggaaatgaaata 6240
 gtgaatggac caataataat gactagagaa gaaagaatga agattgttca tggaaatattaa 6300
 gaacgaatat tggataaataat tggggatgat gttaaggcta ttgggtttt tggctcttt 6360
 ggtcgtcaga ctgatgggcc ctattcgat attgagatga tgtgtgtcat gtcaacagag 6420
 gaacgagagt tcagccatga atggacaacc ggtgagtggaa aggtgaaagt gaattttgat 6480
 agcgaagaga ttctactaga ttatgcattt caggtggaaat cagattggcc gcttacacat 6540
 ggtcaatttt tcttatttt gccgattttt gattcaggtg gataacttaga gaaagtgtat 6600
 caaactgcta aatcggtaga agcccaaaccg ttccacgatg cgatttgcgc cttatcgta 6660
 gaagagctgt ttgaatatgc aggcaaattgg cgtaatattc gtgtgcaagg accgacaaca 6720
 tttctaccat ctttgactgt acaggttagca atggcagggtg ccatgttcat tggctctgc 6780
 catcgcatct gttatacgac gagcgcttcg gtcttaactg aagcagttaa gcaatca 6837

<210> 50
 <211> 817
 <212> DNA
 <213> Artificial sequence

<220>
 <223> Primer

<400> 50
 gaattccggc ccaacgatgg ctgattccg ggttgacggc cggcggaaacc aagggggtat 60
 cggtcggcgg aaatgaaggc ctgcggcgag tgcgggcctt ctgtttttag gattataatc 120

agagtatatt gaaagttcg cgatcttgc gtataattgt tttaggcata gtgcaatcga 180
taagcttcaa ttcggaggcc gttattatat catgagcgaa aatgtataaa aagaaactga 240
aaacaagaaa aattcaagag gacgtaattt gacatttgg ttatatccag aatcagcaaa 300
agccgagtgg ttagagtatt taaaagagtt acacattcaa tttgttagtgt ctccattaca 360
tgatagggat actgatacag aaggtaggat gaaaaaagag cattatcata ttctagtgtat 420
gtatgagggt aataaatctt atgaacagat aaaaataatt acagaagaat tgaatgcgac 480
tattccgcag attgcaggaa gtgtgaaagg tcttgagata tatatgcttc acatggacga 540
tcctaataaaa tttaaatatc aaaaagaaga tatgatagtt tatggcggtg tagatgttga 600
tgaattatta aagaaaacaa caacagatag atataaatta attaaagaaa tgattgagtt 660
tattgatgaa caaggaatcg tagaatttaa gagttaatg gattatgcaa tgaagttaa 720
atttgatgat tggttcccgc ttttatgtga taactcggcg tatgttattc aagaatataat 780
aaaatcaaataat cggtataaaat ctgaccgata gggatcc 817